



**Better Buildings Residential Network  
Peer Exchange Call Series:**  
*Choosing Wisely...Energy Efficient and Other Building  
Products*

August 9, 2018

# Agenda and Ground Rules

- Agenda Review and Ground Rules
- Opening Poll
- Residential Network Overview and Upcoming Call Schedule
- Featured Speakers:
  - **Lauren Asplen**, BlueGreen Alliance
  - **Paul Torcellini**, National Renewable Energy Laboratory
  - **Billy Weber**, Healthy Building Network
- Open Discussion
- Closing Poll and Announcements

## Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

# Better Buildings Residential Network

## Join the Network

### Member Benefits:

- Recognition in media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- Solution Center guided tours

### Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year

### Upcoming calls:

- September 13<sup>th</sup>: The Fruits of Your Labor(s) Day: Workforce Development
- September 27<sup>th</sup>: Back to School: Building Science Training

*Peer Exchange Call summaries are posted on the Better Buildings [website](#) a few weeks after the call*

*For more information or to join, for no cost, email [bbresidentialnetwork@ee.doe.gov](mailto:bbresidentialnetwork@ee.doe.gov), or go to [energy.gov/eere/bbrn](http://energy.gov/eere/bbrn) & click Join*



**Lauren Asplen**  
BlueGreen Alliance



# Close the Door on Hazardous Chemicals in Building Products



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FOUNDATION**

[www.bgafoundation.org](http://www.bgafoundation.org)



# building clean

Increase awareness and urge substitution or elimination of harmful chemicals used in energy efficient housing products.



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# Green ≠ Health

“A green claim should never be confused with the toxicity profile of a product.”

-- American Chemistry Council



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# Spend 90% of time indoors ...

... and building materials are  
number one usage for the  
top 20 chemicals by volume  
reported to EPA.



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# Healthy Buildings

39.2% of  
doctor-diagnosed asthma  
among U.S. children is  
attributable to residential  
risk factors.



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# Apartments Built under “Breathe Easy”

- Asthmatic children had 63 percent more symptom-free days
- Dramatic improvements in lung function
- 66% reduction in need for urgent medical care



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# What Is the Danger?

Hazard = *potential* for a substance to do harm.

Risk = the statistical *probability* that a population will be exposed to the hazard in a way that is likely to cause harm.

A risk assessment = hazard plus exposure or how likely someone is to be exposed in a certain context, and how much exposure it would take to make that person sick.



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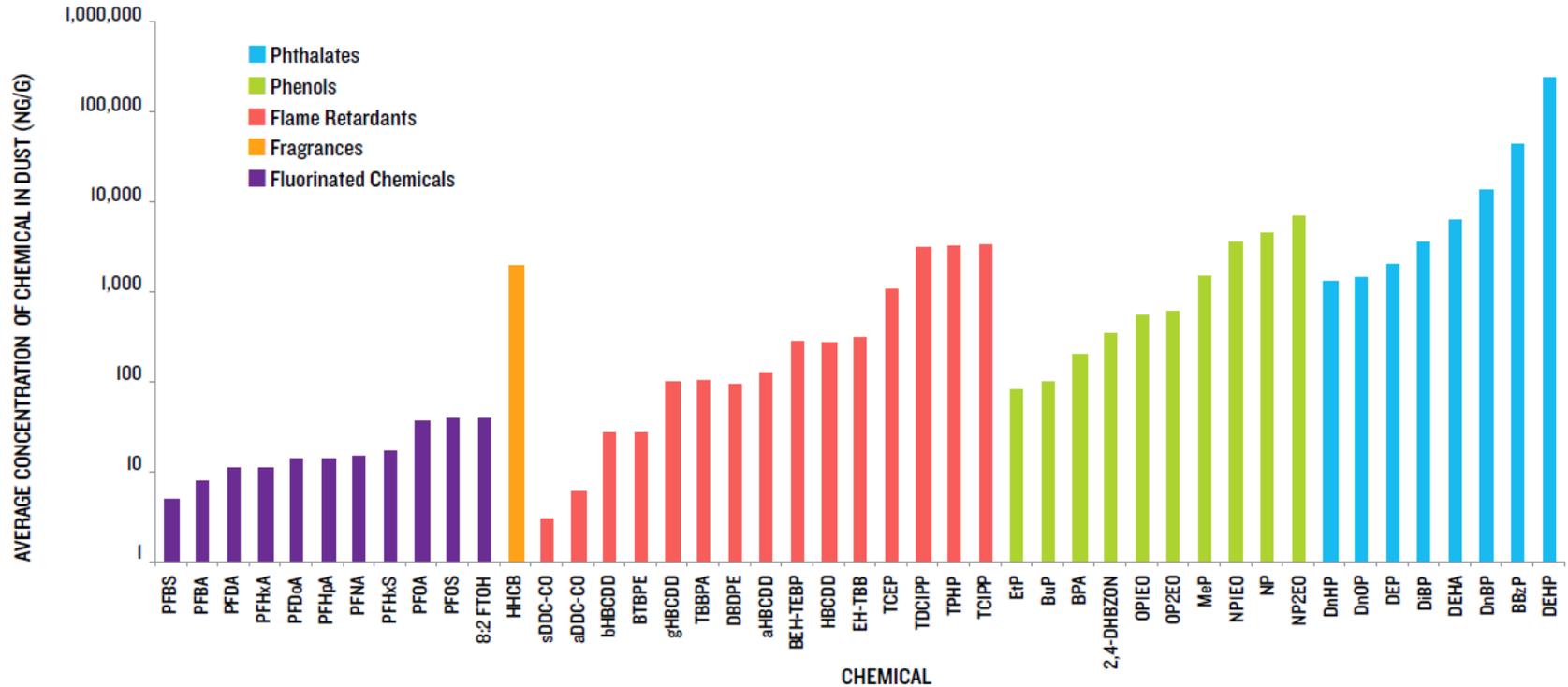
# Hazardous Substances Stick Around



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# Not Just Dirt



Average (geometric mean) dust levels in nanograms of chemical per gram of dust for the 45 chemicals reported in at least three data sets. The average concentration of DEHP is about 45,000 times higher than PFBS.



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# Two of Biggest Concerns

Volatile Organic Compounds = chemicals that off-gas or get in the air

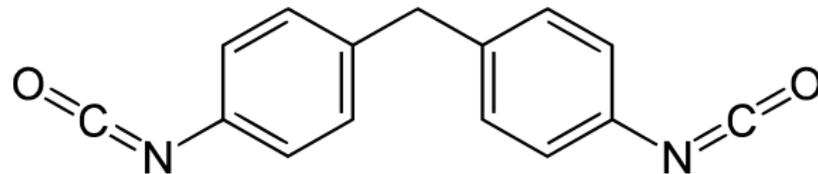
Persistent Bioaccumulative Toxic chemicals = get into the environment and stay there



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# Building Products with Potential Hazards

- Insulation
- Sealants
- CFL light bulbs
- Paint
- Wall Coverings
- Flooring



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# Building Products with Asthmagens

## Insulation

- Ethanolamines
- Isocyanates (SPF)
- Styrene (EPS/XPS)
- Acrylates
- Formaldehyde (mineral wool)

## Paint

- Isocyanates
- Acrylates

## Adhesives/Sealants

- Bisphenol A
- Ethanolamines
- Acrylates
- Phthalates
- Formaldehyde
- Ammonium hydroxide

## Flooring

- Isocyanates (engineered wood)
- Acrylates
- Phthalates

## Wall coverings

- Phthalates

## Carpets

- Isocyanates (backing)
- Phthalates (backing)

## Wallboard

- Formaldehyde

## Composite Board

- Bisphenol A

## Coatings and Finishes

- Isocyanates
- Styrene
- Acrylates



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# Health Product Declaration Declare ● UL Product Lens

**Declare.**

**Your Product**  
**Your Company**  
Final Assembly: City, State, Country  
Life Expectancy: 000 Years  
End of Life Options: Recyclable (42%), Landfill

**Ingredients:**  
Your First Ingredient (Locally Sourced Location, ST), Sustainably Sourced Ingredient (Location, ST), Non-toxic Item (Location, ST), Living Building Challenge Red List\*, Another Component, US EPA Chemical of Concern, Last Ingredient

**Living Building Challenge Criteria:**  
XXX-0000      exp. 11/11/2011  
VOC Content: 0.00 mg/m<sup>3</sup>    VOC Emissions: CDPH Compliant

**Declaration Status**  
 LBC Red List Free  
 LBC Compliant  
 Declared

End-of-life options: take-back programs, salvageable or reusable in its entirety, recyclable (%); landfill; hazardous waste.

Ingredient are reported by component. Ingredients without restriction appear in grey; Red List chemicals appear in dark orange; EPA COC and REACH chemicals appear in light orange. (Reported raw material extraction locations are listed in parenthesis.)

Declare Identifier for company and product, valid for 12 months.

VOC Information and CDPH Compliance.

Verification that product complies with Living Building Challenge Red List.



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# VOC Verifications

Greenguard



for illustrative purposes only

SCS Global Advantage



Green Seal



floorscore



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# Certifications

Cradle to Cradle  
Living Product Challenge  
Declare—Red List Free



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buildingclean.org



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[www.bgafoundation.org](http://www.bgafoundation.org)

# Harmful Chemicals Section

## What's In These Products?



Healthy Choices



Facing the Challenges



Hazards by Sector



Certified Product  
Searches



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# Health Related Tools on Website

## Phthalates

Phthalates are used as a plasticizer in sealants and caulks to promote better low-temperature properties, allow for higher filler loads and improve adhesion and flexibility.

How can this chemical affect my health?

### Chronic (Long Term) Effects



**Reproductive Harm** – Can disrupt the male or female reproductive systems, changing sexual development, behavior or functions, decreasing fertility, or resulting in loss of the fetus during pregnancy.



**Asthma Trigger** – Can result in high sensitivity so that small quantities trigger asthma, nose or sinus inflammation or other allergic reactions in the respiratory system.

- **Charts** showing hazards by product and chemical
- **Chemical Fact Sheets** outlining acute and chronic health impacts
- **Product Searches** for those with health certifications
- **Content Listings** to highlight what might be found in products
- **Explanation** of various certifications and resources



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# Tools on Website

- **Product Searches** for those with health certifications

CERTIFIED PRODUCTS:  
**INSULATION**

INSULATION    SEALANTS    WATER FILTRATION

PAINT AND WALLCOVERINGS    WINDOWS, DOORS, AND SKYLIGHTS    FLOORING

Desktop users: You may select multiple options from the drop down menus  
On Windows: Hold down the control (ctrl) button to select or deselect multiple options  
On Mac: Hold down the command button to select or deselect multiple options

CERTIFICATIONS	MATERIAL	TRANSPARENCY
C2C Material Health Certified C2C Material Health Certified C2C Silver GREENGUARD Gold GREENGUARD Gold /FF	Aerogel Cellulose Denim Fiberglass Mineral Wool	HPD LBC Compliant - Declare Red List Free - Declare

APPLY

RESET



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**building**  
clean

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202-706-6910

Twitter: @BuildingClean



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[www.bgafoundation.org](http://www.bgafoundation.org)

# Three Key Take-Aways

- A "green" product is not necessarily a healthy product; many such items have high toxicity profiles and attendant risks.
- Buildings constructed with less- or non-toxic materials can dramatically reduce the incidences of respiratory and other afflictions otherwise caused by less-safe materials.
- Look for healthy-product certifications including Cradle to Cradle, Living Product Challenge, and Declare - Red List Free when selecting building materials.





**Paul Torcellini**  
National Renewable Energy Laboratory

# **Living at Zero: A Look at Decisions to Achieving a Zero Energy Home**

**August 9, 2018**

**Paul A. Torcellini, Ph.D., P.E.**

# Who am I?

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- Principal Engineer for National Renewable Energy Laboratory
- This presentation is about my house—not tied to my work doing commercial energy efficiency or zero energy research for NREL
- Numerous papers on zero energy buildings

# The task: Build a new house for the family

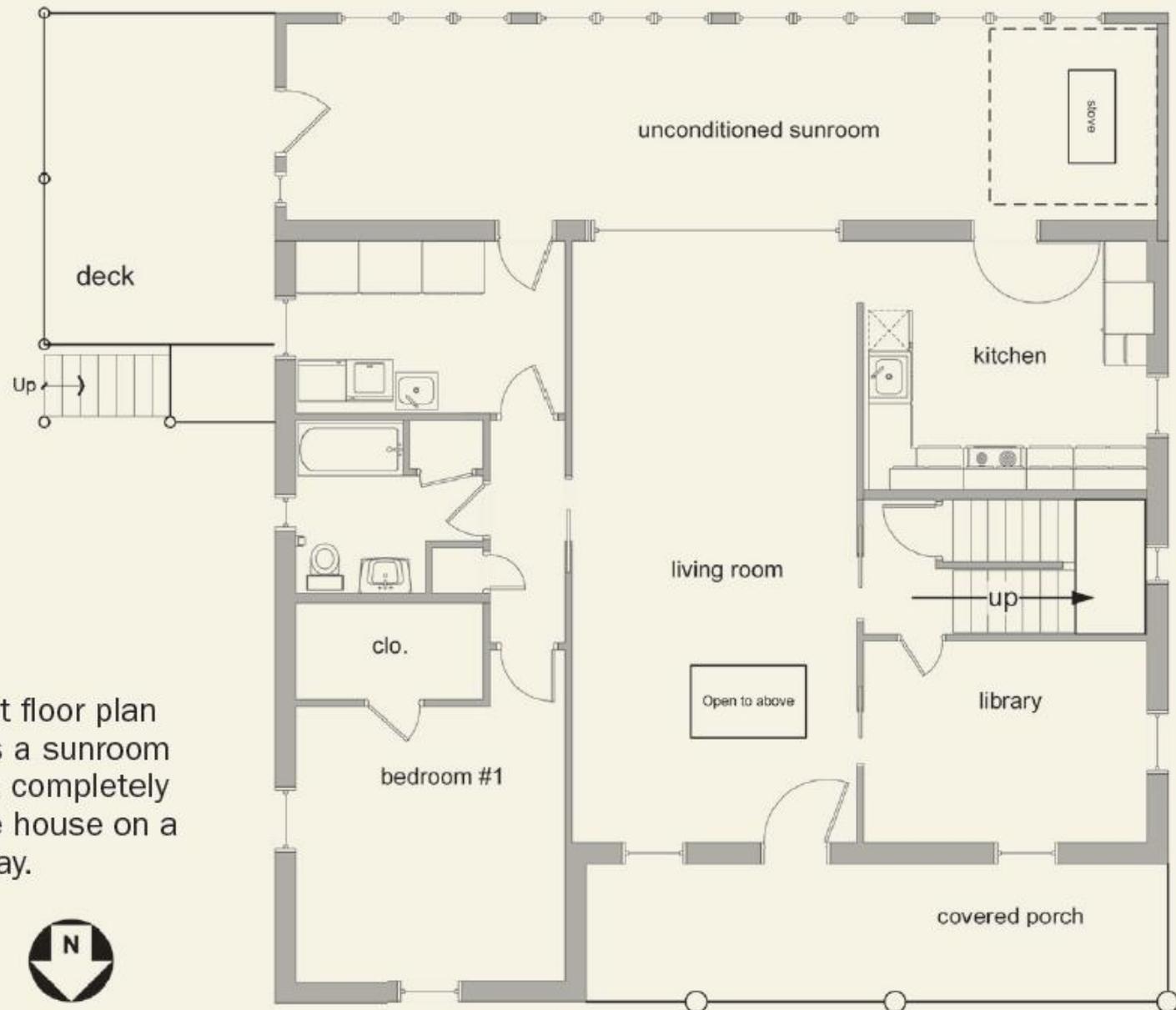
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- Zero energy house
- Sustainable aspects vs. available resources
- Cost constraints
- Aesthetic preferences

# A starting point...

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- Use the ILFI (International Living Future Institute) Red List
- Buy local
- No VOCs
  - Anything that smells could be an issue
- Prevent water damage, mold issues and the like
- Certification programs—which “test” do you choose?
  - DOE Zero Energy Ready Home; Energy Star; Water Sense; LEED; ILFI; Well Building; Passive House, etc.



Compact floor plan includes a sunroom that can completely heat the house on a sunny day.



# Building Design and Construction

- Focused on lots of air circulation; high R-value envelope; tight envelope (0.80 ACH50); Passive House is 0.60 max
  - Double Hung windows
- Insulation choices
  - Fiberglass; cellulose; recycled denim, spray foam
- Positive Drainage
- Self-shading
- Low-e windows







# Lighting and Mechanical



- All LED lighting
- All electric for utilities (no natural gas or fuel oil)
- Heat pump hot water heater
  - Carbon Dioxide as refrigerant
  - Radiant floors
- Air to air heat exchanger
- Plumbing materials and configuration
  - Rainwater
  - Graywater vs. blackwater
- Electrical (and the roof)



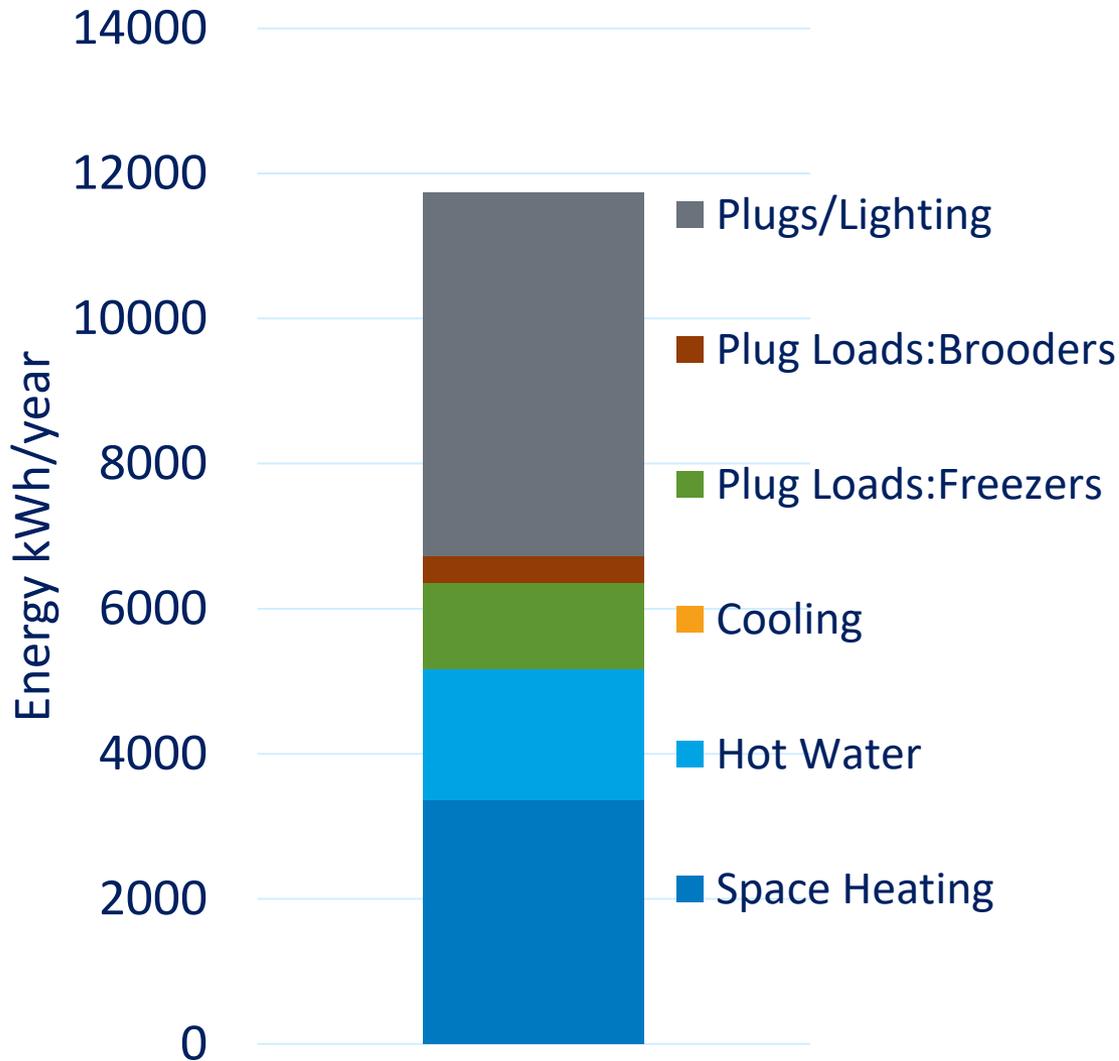
- **Finish Materials**
  - Cabinets
  - Flooring and finishes
  - Paint



# Questions and Comments



# 2017 Energy Totals



End Use	2017 Totals (kWh)	Estimate from HERS (kWh)
Heating/Hot Water	5,161	6,272
Cooling	0	1,172
Plug Loads	6,573	7,562
<b>Total</b>	<b>11,734</b>	<b>15,006</b>
PV	9,896	12,368

Using the conditioned area, the EUI is 11.1 kBtu/ft<sup>2</sup>-yr on a site basis and 35.1 kBtu/ft<sup>2</sup>-yr on a source basis.



YOUR HOME WAS DESIGNED, ENGINEERED,  
AND CONSTRUCTED IN CONFORMANCE TO  
U.S. DEPARTMENT OF ENERGY (DOE)  
GUIDELINES FOR EXTRAORDINARY  
LEVELS OF EXCELLENCE AND QUALITY.

This home built at 76 Weeks Road  
By Paul Torcellini  
Verified by Karla Butterfield  
an independent professional  
organization, to meet or exceed  
strict home performance  
guidelines set by  
The U.S. Department of Energy  
on 2/15/2016

THIS HOME MEETS OR EXCEEDS THE MINIMUM  
CRITERIA FOR THE FOLLOWING:

DOE Zero Energy Ready Home Quality Management Guidelines



REM/Rate - Residential Energy Analysis and  
Rating Software v14.6.1

SAM RASHKIN, CHIEF ARCHITECT  
BUILDING TECHNOLOGIES  
U.S. DEPARTMENT OF ENERGY



# Additional Resources

- Write ups of Paul's project
  - [High Performance Buildings Magazine](#)
  - [Steven Winter Associates, Inc. Case Study](#)
- Paul can be reached at [Paul.Torcellini@nrel.gov](mailto:Paul.Torcellini@nrel.gov)

# Three Key Take-Aways

- Paul began the design of his home by consulting the International Living Future Institutes Red List
- All materials had to pass the "smell test;" if it smells - don't use it.
- Finish materials (including those contained by cabinets, flooring/finishes and paint) were given especially rigorous assessment, as these are among the biggest offenders with respect to toxicity.





**Billy Weber**  
Healthy Building Network

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# **HOMEFREE:** **Introduction and Overview**

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## Our Mission

To advance human and environmental health by improving hazardous chemical transparency and inspiring product innovation.

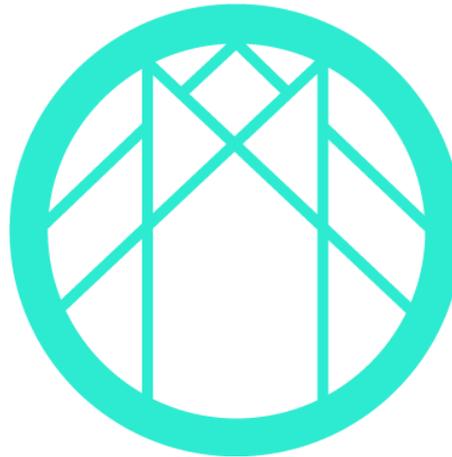


**HEALTHY  
BUILDING  
NETWORK**



## RESEARCH

- Informed Choices for Better Health



## DATA TOOLS

- Pharos
- Data Commons
- Portico



## EDUCATION

- HomeFree



# Toxic Substance Control Act

**85,000**

Number of chemicals in the EPA inventory

**9**

Number of chemicals/groups restricted or banned under TSCA



# Exposure Pathways

**INGESTION**

**INHALATION**

**DERMAL**



# **Chemical Hazards & Health Endpoints**

**PERSISTENT AND  
BIOACCUMULATIVE TOXICANTS  
(PBT)**

**CARCINOGENS AND MUTAGENS**

**DEVELOPMENTAL & REPRODUCTIVE  
TOXICANTS, AND ENDOCRINE  
DISRUPTION**

**ASHTMAGENS**



**Why is  
transparency  
important?**

**Right to know**

**Need to identify priorities**

**Innovation**

**Accelerates change**



Images: CCH/Mithun, Liberty Bank Building; HBN; MSR, Rose



A national initiative supporting affordable housing leaders who are improving human health by using less toxic building materials.



Mechanical Installation

Peel and Stick

Acrylic

Epoxy

Polyurethane



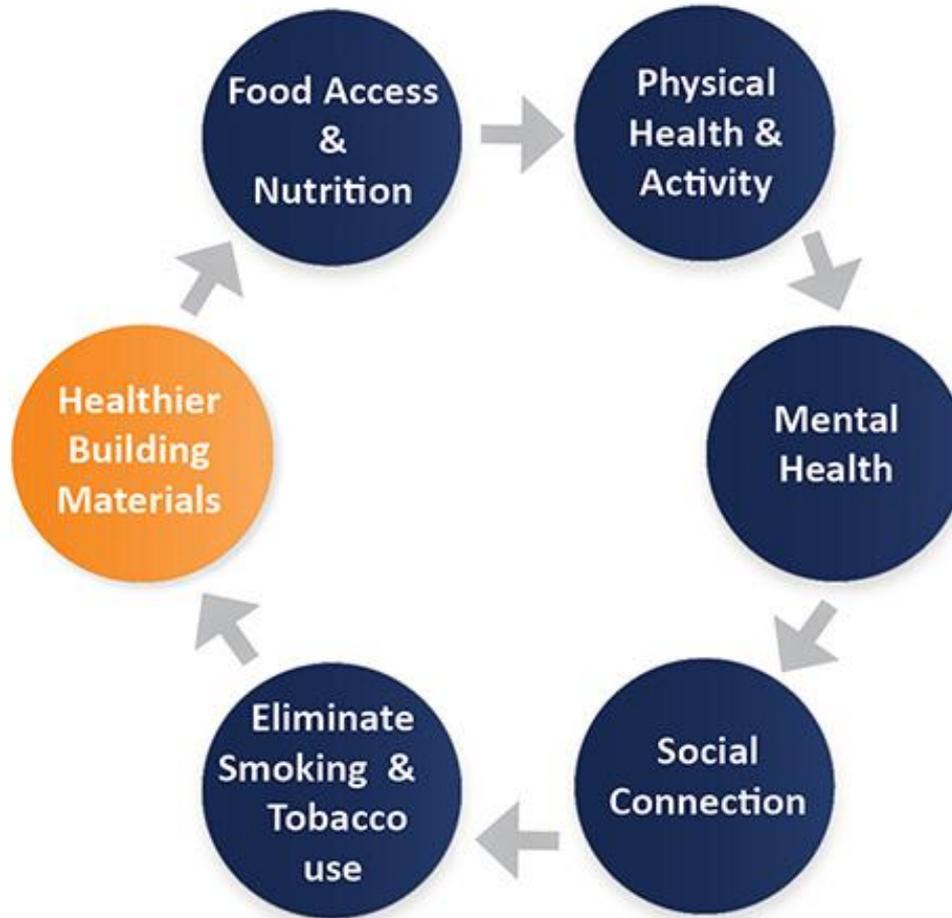
## Why Materials for affordable housing?

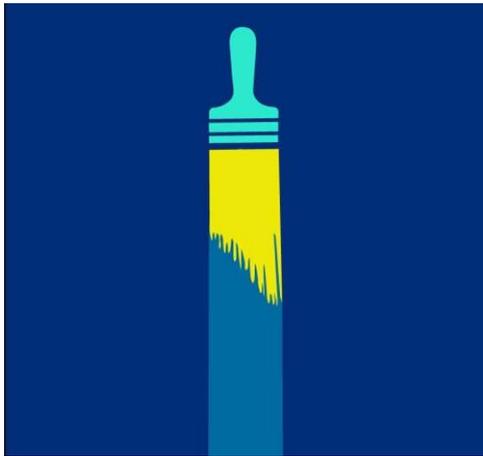
### Disproportionate Impacts

- Low-income Families/Children
- Construction Workers
- Fenceline Communities

### Opportunity – Multiple Attributes

- Energy – Climate - Health
- Actionable Solutions





## **Products**

Flooring  
Paint  
Drywall  
Countertops  
Cabinetry & Millwork  
Insulation  
Flooring Adhesives  
Sealants



## **Case Study**

Demonstration  
Projects



## **Baseline Specifications**

California  
Louisiana  
Minnesota  
Pacific Northwest  
Washington, DC  
Metro



### Related Product News

#### It's Not Just About VOCs: Select APE-free Paint, Too

Earlier this year, the Healthy Building Network (HBN) recommended specifying NPE-free paints in addition to low- or very low VOC paints to help protect human health and the environment. HBN is expanding this recommendation to include the broader category of chemical compounds known as APEs, ...

#### A Brush With Research: A HomeFree Member Searches for Healthy Paint

Guest blogger: Sunshine Mathon, Foundation Communities in Austin, TX  
Spoiler Alert: Sherwin-Williams Pro Mar 400 Zero VOC paints was identified as the "sweet spot" of cost and health...

## Paints by Type Hazard Spectrum

Individual paints can vary significantly in their health profiles, however some categories of interior paints are better than others when it comes to the health of building occupants and installers. Below, HBN ranks different types of interior latex paints on the market on a simplified spectrum.[1] Products in the green categories are better options than those in the orange or red, and products in the yellow categories are generally less preferable than those at the top, but are better choices than those at the bottom.

[Read more..](#)

[GS-11 Certified, Very Low VOC Content, and Low VOC Emissions](#)

[APE-free, Low VOC Content, and Low VOC Emissions](#)

[Low VOC Content](#)

[Standard](#)

[Recycled Paints](#)

[Specialty Paints](#)

CASE STUDY

# Liberty Bank Building



LIBERTY BANK BUILDING, NON-PROFIT FAMILY HOUSING, SEATTLE, WASHINGTON

## PRODUCT CATEGORIES

### FLOORING

Green Label; Free of PVC and chlorine -no recycled content,   
the Liberty Bank Building

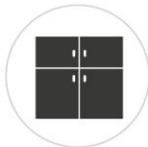
Liberty Bank Building is a 115-unit affordable housing community located in the Central Area, developed by Capitol Hill Housing (CHH). The design incorporates art and architecture to honor the history of the neighborhood and the Liberty Bank formerly located on the site. The 101,000 s.f., 6-story building includes apartments - studios, 1- and 2- bedrooms

## Pacific Northwest

PROJECTS BASELINE SPECIFICATION REVIEW

- 12 Urban-Large City
- 9 Non-profit
- 10 New Construction
- 3 Not provided
- 2 Rehab

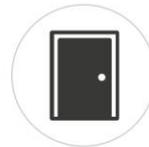
### CABINETRY & MILLWORK



#### Data Summary

- All the projects had requirements for cabinets limiting formaldehyde based binders or formaldehyde emissions.
- About 20% of the projects specified CA 93120/CARB Phase II compliant.
- About 65% of projects specified composite wood products that contain no urea formaldehyde.
- A majority of projects specified cabinet manufacturers, but did not include specific product lines.
- Nearly all projects specified cabinets with a factory finish.
- About 20% of projects specified a laminate (HPL or melamine) or thermofoil finish for exterior faces, with an additional 35% specifying laminate only for interior surfaces.
- All projects specified wood trim/base in at least some part of the units.

### DOORS



#### Data Summary

- About 90% of projects specified doors with a composite core, and about 25% specified hollow core doors with a composite face.
- About 60% of projects that included wood doors with composite core or facing specified no urea formaldehyde - one project further specified that all components be formaldehyde-free.
- Only 2 projects specified a particular product or series; the others provided general information about which materials should be used and often included approved manufacturers.
- Over 80% of projects specified factory finished wood doors with an additional 10% specifying a combination of factory finished and site finished.

#### Specification Recommendations

- Prefer solid wood products over composite.
- When using composite wood, specify core



**Communities of Practice & Partnerships**



**Connecting Energy, Climate & Health**



**Expanded HomeFree Resources & Education**

Making Affordable Multifamily Housing More Energy Efficient

# A Guide to Healthier Upgrade Materials



 **ENERGY  
EFFICIENCY  
FOR ALL**

**Thank you!**

**[homefree.healthybuilding.net](https://homefree.healthybuilding.net)**

# KNOW BETTER

**William Weber**  
**[wweber@healthybuilding.net](mailto:wweber@healthybuilding.net)**

—

**HEALTHYBUILDING.NET**

# Three Key Take-Aways

- Improving the quality of materials used in affordable housing is a significant opportunity to deliver immediate and substantial health improvements.
- Primary exposure pathways for building toxins include ingestion, inhalation, and absorption through skin.
- From an industry perspective, product transparency is vital to identifying priorities, spurring innovation and accelerating change.



# Upcoming Seasonal Messaging Opportunities

Make connections to the new year

Department of Energy

JANUARY 2, 2014

## Resolve to Save Energy This Year



**SAVING ENERGY** *Saves Money*

At the beginning of every new year, millions of Americans make New Year's resolutions, which inevitably are forgotten by the end of January. This year, forget making a New Year's resolution. Instead make a home energy efficiency resolution.

U.S. DEPARTMENT OF ENERGY



AUGUST 21-23,  
2018

CLEVELAND, OHIO

## 2018 Energy Exchange and Better Buildings Summit

- August 21<sup>st</sup>-23<sup>rd</sup> in Cleveland, OH
- Register today!
- Highlights include:
  - Panel sessions and technical trainings (earn CEUs)
  - Peer-to-peer discussions
  - Ask-an-Expert/FEMP Lounge
  - Networking opportunities
  - Pre- and post-conference workshops
  - Better Buildings Partner sessions
  - Building Tours

***For more information and to register:  
[2018energyexchange.com](http://2018energyexchange.com)***

# New Opportunity

SEEA Request for Proposal:

**Innovative EE projects to serve the Southeast**

DUE DATE: September 17<sup>th</sup>, 2017

[RFP Informational Webinar](#)

[Monday, August 13, 2:00 – 3:00 pm ET](#)



# Explore the Residential Program Solution Center

Resources to help improve your program and reach energy efficiency targets:

- [Handbooks](#) - explain *why* and *how* to implement specific stages of a program.
- [Quick Answers](#) - provide answers and resources for common questions.
- [Proven Practices](#) posts - include lessons learned, examples, and helpful tips from successful programs.
- [Technology Solutions](#) **NEW!** - present resources on advanced technologies, **HVAC & Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.



<https://rpssc.energy.gov>

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or future call topic ideas to:  
[bbresidentialnetwork@ee.doe.gov](mailto:bbresidentialnetwork@ee.doe.gov)